

CLAIMS

1. A gravel-or-the-like removing device comprising:
an impeller casing which accommodates an impeller driven by a motor in the inside thereof and has a suction opening at the center of the lower surface,

a peripheral wall for preventing collapse and inflow of gravel or the like which is constituted of a cylindrical body which has an upper end thereof connected to a lower portion of the impeller casing and a lower end thereof opened downwardly and forms a water retention space in the inside thereof, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a lower-end opening thereof communicably connected with the water retention space.

2. A gravel-or-the-like removing device according to claim 1, wherein the peripheral wall for preventing collapse and inflow of gravel or the like has the whole area of a lower-end opening thereof opened.

3. A gravel-or-the-like removing device according to claim 1, wherein a bottom plate is mounted on the lower-end opening of the peripheral wall for preventing collapse and inflow of gravel or the like and a plurality of gravel-or-the-like inflow holes are formed in the bottom plate.

4. A gravel-or-the-like removing device according to claim 1, wherein the peripheral wall for preventing collapse and inflow of gravel or the like has no holes on the entire peripheral surface.

5. A gravel-or-the-like removing device according to claim 1, wherein the peripheral wall for preventing collapse and inflow of gravel or the like is partially perforated to an extent that the collapse and inflow of the gravel or the like into the water retention space can be prevented.

6. A gravel-or-the-like removing device according to claim 1, wherein an output shaft of the motor is extended downwardly after passing through the suction opening of the impeller casing and the peripheral wall for preventing collapse and inflow of gravel or the like and an agitator is fixedly secured to an extended end of the output shaft.

7. A gravel-or-the-like removing device according to claim 1, wherein a flat plate for preventing winding of string-like material is mounted on the lower surface of the impeller casing at the water retention space side.

8. A gravel-or-the-like removing device according to claim 1, wherein a cylinder²⁴ for preventing winding of string-like material is mounted on an outer peripheral surface of the agitator mounting shaft.

9. A gravel-or-the-like removing device comprising:
an impeller casing which accommodates an impeller driven by a motor in the inside thereof and has a suction opening at the center of the lower surface,

a cylindrical strainer which has an upper end thereof connected to a lower portion of the impeller casing and a lower end thereof opened downwardly,

a peripheral wall for preventing collapse and inflow of

gravel or the like which is constituted of a cylindrical body arranged around the strainer, makes an upper end of the cylindrical body connected to a lower portion of the impeller casing and a lower end thereof reach a position substantially equal to a lower end surface of the cylindrical strainer and forms a water retention space including the inside of the cylindrical strainer therein, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a lower-end opening thereof communicably connected to the water retention space.

10. A gravel-or-the-like removing device according to claim 9, wherein the peripheral wall for preventing collapse and inflow of gravel or the like has no holes on the entire peripheral surface.

11. A gravel-or-the-like removing device according to claim 9, wherein the peripheral wall for preventing collapse and inflow of gravel or the like is partially perforated to an extent that the collapse and inflow of the gravel or the like into the water retention space can be prevented.

12. A gravel-or-the-like removing device according to claim 9, wherein an output shaft of the motor is extended downwardly after passing through the cylindrical strainer and an agitator is fixedly secured to an extended end of the output shaft.

13. A gravel-or-the-like removing device according to claim 9, wherein the communicable communication of the lower-end opening of the water suction pipe to the water retention space is performed by communicably connecting the lower-end opening

of the water suction pipe to the water suction opening formed in the peripheral wall for preventing collapse and inflow of gravel or the like.

14. A gravel-or-the-like removing device according to claim 9, wherein the lower-end opening of the water suction pipe penetrates the peripheral wall for preventing collapse and inflow of gravel or the like and thereafter is communicably connected with a water suction opening formed in the cylindrical strainer.

15. A gravel-or-the-like removing device according to claim 9, wherein a plurality of water suction pipes are provided and the lower-end openings of one or more water suction pipes are communicably connected with water suction openings formed in the peripheral wall for preventing collapse and inflow of gravel or the like and the lower-end openings of remaining one or more water suction pipes are made to penetrate the peripheral wall for preventing collapse and inflow of gravel or the like and are communicably connected with the water suction openings formed in the cylindrical strainer.

16. A gravel-or-the-like removing device according to claim 9, wherein the cylindrical strainer is formed of a non-perforated peripheral wall.

17. A gravel-or-the-like removing device comprising:

an impeller casing which accommodates an impeller driven by a motor in the inside thereof and has a suction opening at the center of the lower surface,

a cylindrical strainer which has an upper end thereof connected to a lower portion of the impeller casing and a lower

end thereof opened downwardly,

a cover for preventing collapse and inflow of gravel or the like which is constituted of a bowl-shaped body opened downwardly and arranged around the impeller casing and the cylindrical strainer, makes an upper end of the bowl-shaped body connected to a motor casing which is mounted on the impeller casing and a lower end bowl-shaped body reach a position substantially equal to a lower end surface of the cylindrical strainer and forms a water retention space including the inside of the cylindrical strainer therein, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a lower-end opening thereof communicably connected to the water retention space.

18. A gravel-or-the-like removing device comprising:

an impeller casing which accommodates an impeller driven by a motor in the inside thereof and has a suction opening at the center of the lower surface,

a cylindrical strainer which has an upper end thereof connected to a lower portion of the impeller casing and a lower end thereof opened downwardly,

a cover for preventing collapse and inflow of gravel or the like which is constituted of a bowl-shaped body opened downwardly and arranged to surround the whole gravel-or-the-like removing device including the impeller casing and the strainer and makes a lower end of the bowl-shaped body reach a position substantially equal to a lower end surface of the cylindrical

strainer and forms a water retention space including the inside of the cylindrical strainer therein, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a lower-end opening thereof communicably connected to the water retention space.

19. A gravel-or-the-like removing device comprising:

an impeller casing which accommodates an impeller driven by a motor in the inside thereof and has a suction opening at the center of the lower surface,

a cylindrical strainer which has an upper end thereof connected to a lower portion of the impeller casing and a lower end thereof opened downwardly,

a plurality of rotary digging cutters which are driven by motors,

a peripheral wall for preventing collapse and inflow of gravel or the like which is constituted of a cylindrical body being arranged around the cylindrical strainer and having a cross section in a plan view sufficiently wide to cover the rotary digging cutters together with the cylindrical strainer from above and makes an upper end thereof contiguously connected to a lower portion of the impeller casing and a lower end thereof reach a position substantially equal to a lower end surface of the cylindrical strainer and forms a water retention space including the inside of the cylindrical strainer therein, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a

lower-end opening thereof communicably connected to the water retention space.

20. A gravel-or-the-like removing device comprising:
an impeller casing which accommodates an impeller driven by a motor in the inside thereof and has a suction opening at the center of the lower surface,

a cylindrical strainer which has an upper end thereof connected to a lower portion of the impeller casing and a lower end thereof opened downwardly,

a plurality of jet nozzles which are arranged around the cylindrical strainer circumferentially and eject jet water downwardly upon actuation of a jet water supply pump,

a peripheral wall for preventing collapse and inflow of gravel or the like which is constituted of a cylindrical body being arranged around the cylindrical strainer and having a cross section in a plan view sufficiently wide to cover the jet nozzles together with the cylindrical strainer from above and makes an upper end thereof contiguously connected to a lower portion of the impeller casing and a lower end thereof reach a position substantially equal to a lower end surface of the cylindrical strainer and forms a water retention space including the inside of the cylindrical strainer therein, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a lower-end opening thereof communicably connected to the water retention space.

21. A gravel-or-the-like removing device comprising:

an impeller casing which accommodates an impeller driven by a motor in the inside thereof and has a suction opening at the center of the lower surface,

movable rotary digging cutter means which is disposed below a lower end portion of the impeller casing and is rotatable about a horizontal axis and is horizontally movable in the direction perpendicular to the horizontal axis,

a peripheral wall for preventing collapse and inflow of gravel or the like which is constituted of a cylindrical body being arranged below the impeller casing and having a cross section in a plan view sufficiently wide to cover the movable rotary digging cutter means from above and makes an upper end thereof contiguously connected to a lower portion of the impeller casing and a lower end thereof reach a position substantially equal to an upper portion of the movable rotary digging cutter means and forms a water retention space therein, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a lower-end opening thereof communicably connected to the water retention space.

22. A gravel-or-the-like removing device comprising:

a digging cutter which is rotatably driven by a motor about a vertical axis,

a peripheral wall for preventing collapse and inflow of gravel or the like which is constituted of a cylindrical body being arranged above the digging cutter and having a cross section in a plan view sufficiently wide to cover the digging cutter

from above and makes an upper end thereof contiguously connected to a lower portion of a motor supporting frame and a lower end thereof reach a position substantially equal to an upper portion of the digging cutter and forms a water retention space therein,

a suction pump installed outside a water region and having a suction opening thereof communicably connected with the water retention space through a gravel or the like suction pipe, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a lower-end thereof communicably connected to the water retention space.

23. A gravel-or-the-like removing device comprising:

a suction pump having an impeller casing which accommodates an impeller driven by a motor in the inside thereof and has a suction opening at the center of the lower surface,

a cover for preventing collapse and inflow of gravel or the like which is mounted on the suction pump and forms a water retention space which is communicable with the suction opening of the impeller casing at least below the suction opening of the impeller casing, and

a water suction pipe which has an upper-end opening thereof opened in water above a gravel-or-the-like piled level and a lower-end opening thereof communicably connected with the water retention space.